TIME PROTOCOL FOR TIME-OF-FLIGHT INSTRUMENTS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of, and claims priority under 35 U.S.C. §120 to, U.S. patent application Ser. No. 13/960,832, entitled "TIME PROTOCOL FOR TIME-OF-FLIGHT INSTRUMENTS," filed on Ser. No. 13/960,832, the entirety of which is hereby incorporated by reference as if fully rewritten herein.

FIELD OF THE INVENTION

[0002] The present disclosure is related to the tracking of events within the field of particle detection.

DISCUSSION OF THE PRIOR ART

[0003] In a particle detector facility, devices may be configured to detect events such as the detection of particles and particle collisions within a collider. The devices may also be configured to interoperate with other devices to identify, with high precision, the occurrence time of the events. Many such facilities are configured to record the time of such events in a relative manner. For example, a periodic clock signal may be broadcast throughout the facility over a proprietary network. Respective devices may include a clock component that identifies the amount of time elapsed since the latest periodic clock signal, and, upon detecting an event, may retrieve and record the offset from the latest clock signal. The absolute time, sequence, and/or duration of the respective events may later be calculated by adding the time of the clock signal and the offset recorded for the event.

BRIEF DESCRIPTION OF THE INVENTION

[0004] The following presents a simplified summary of the invention in order to provide a basic understanding of some example embodiments of the invention. This summary is not an extensive overview of the invention. Moreover, this summary is not intended to identify critical elements of the invention nor delineate the scope of the invention. The sole purpose of the summary is to present some concepts of the invention in simplified form as a prelude to the more detailed description that is presented later.

[0005] In accordance with one embodiment, the present invention provides a system for configuring a particle detector facility to record event times. In one such embodiment, this system includes a grandmaster clock designating component, which includes instructions that, when executed on a processor of a device, causes the device to, among at least two facility devices of a facility device set of the particle detector facility, the respective facility devices selected from a facility device type set including a beam monitor facility device, a neutron instrument facility device, a neutron chopper facility device, a nuclear reactor facility device, a particle accelerator facility device, a network router facility device, and a user workstation facility device, identify one facility device as a grandmaster clock. This system also includes a clock synchronizing component, which includes instructions that, when executed on a processor of a selected facility device further including a clock component and a data store, cause the selected facility device to synchronize the clock component with the grandmaster clock; and upon detecting an event, retrieve from the clock component of the selected facility device an absolute event timestamp that is independent of event times of other events, and store the event and the absolute event timestamp in the data store.

[0006] In accordance with another embodiment, the present invention provides a method of configuring a particle detector facility to record event times. In one such embodiment, the method includes, among at least two facility devices of a facility device set of the particle detector facility, the respective facility devices selected from a facility device type set including a beam monitor facility device, a neutron instrument facility device, a neutron chopper facility device, a nuclear reactor facility device, a particle accelerator facility device, a network router facility device, and a user workstation facility device, identifying one facility device as a grandmaster clock; and for respective selected facility devices that include a clock component and a data store, configuring the selected facility device to synchronize the clock component with the grandmaster clock; and, upon detecting an event, retrieve from the clock component of the selected facility device an absolute event timestamp that is independent of event times of other events; and store the event and the absolute event timestamp in the data store.

[0007] In accordance with yet another embodiment, the present invention provides a computer-readable storage medium storing instructions that enable the facility devices of a particle detector facility to record event times. In one such embodiment, the computer-readable medium stores instructions that, when executed on a process of respective at least two facility devices of a facility device set of the particle detector facility, the respective facility devices selected from a facility device type set including a beam monitor facility device, a neutron instrument facility device, a neutron chopper facility device, a nuclear reactor facility device, a particle accelerator facility device, a network router facility device, and a user workstation facility device, cause the respective facility devices to identify one facility device as a grandmaster clock. The computer-readable medium also includes instructions that, when executed on the processor of respective facility devices having a data store, cause the facility device to synchronize the clock component with the grandmaster clock; and, upon detecting an event, retrieve from the clock component of the selected facility device an absolute event timestamp that is independent of event times of other events; and store the event and the absolute event timestamp in the data store.

[0008] To the accomplishment of the foregoing and related ends, the following description and annexed drawings set forth illustrations of certain aspects and embodiments. These are indicative of but a few of the various ways of embodying one or more aspects of the presented techniques. Other aspects, advantages, and embodiments of the present invention will become apparent from the following detailed description when considered in conjunction with the annexed drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The foregoing discussion of the present invention will become apparent to those skilled in the art to which the present invention relates upon reading the following description with reference to the accompanying drawings, in which:

[0010] FIG. **1** is a schematic illustration of an example particle detector facility that includes an example set of